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## DATA SCIENCE IN HEALTHCARE SYSTEM

<sup>1</sup>Bhagyashri Ashok Madge,

<sup>1</sup>Student,

<sup>1</sup>MCA,

<sup>1</sup>BVIMIT, Navi Mumbai, India

<sup>Ms</sup> Gunjan Behl

Asst. Professor, Navi Mumbai, India

### ABSTRACT

The main aim of this paper is to provide a deep analysis on the research field of healthcare data analytics. The paper has listed some data analytics tools and techniques that have been used to improve healthcare performance in many areas such as: medical operations, reports, decision making, and prediction and prevention system. Over the last few years, healthcare data has become more complex for the reason that large amount of data are being available lately, along with the rapid change of technologies and mobile applications and new diseases have discovered. Therefore, healthcare sectors have believed that healthcare data analytics tools are really important subject

*Index Terms* - Component, formatting, style, styling, insert.

### INTRODUCTION :

Today's healthcare industries are moving from volume-based business into value-based business, which requires an overwork from doctors and nurses to be more productive and efficient. This will improve healthcare practice, changing individual life style and driving them into longer life, prevent diseases, illnesses and infections.

in order to manage a large amount of complex data, which can lead to improve healthcare industries and help medical practice to reach a high level of efficiency and work flow accuracy.

### LITERATURE SURVEY :

#### **Information System & Information Technology in Healthcare Sectors :**

- The healthcare sector is widely considered as one of the most important industries in information technology (Wager 2005). More and more, information technology has been considered as a practice that facilitates

healthcare performance through using data and information efficiently within the healthcare sectors.

### HEALTHCARE ANALYTICS & DATA MINING

- Data Mining is described as a process by which data is gathered, analysed stored in order to produce useful and high quality information and knowledge.

-This term also includes the way of how this data is gathered, filtering and preparation of the data for use and finally the processing of data to support data analytics and predictive modelling (Russom 2011).

### PATIENTS ROLE IN HEALTHCARE ANALYTICS :

- This section is concerned about how individuals (and patients in specific) can improve healthcare analytics through understanding the small and personal data, as well as educate themselves in how to

collaborate with the healthcare data analytics to reach a high level of efficiency and accuracy (Luciano 2013).

- Principally, to perform good data analytics, first of all we should teach individuals how to understand and realize the importance of dealing with such data, for instance how to deal with breast cancer (Hanoch 2012).

### **METHODOLOGY :**

- The objective of this paper was to conduct a review, which encourages professionals, doctors, medical staff and patients to adopt and utilize technologies in order to assist healthcare analytics and improve decision making process in our everyday life .

- Our method has followed two steps:

#### 1) searching for initial and related studies :

- Searching for initial and related studies: the first step in order to find the articles was to specify and identify main keywords (Dieste et al. 2009). A survey was conducted to study relevant papers published since 2010 in the information system field in general and healthcare analytics and medical decision support system in specific.

#### 2) Relevance appraisal and evaluation, and finally extracting data :

- The following searching phrases were used and structured in searching for relevant papers in many different databases – i.e. the relevant and related papers should contain in its titles, keywords, abstract or full text the word “healthcare” along with any of “analytics”, “metrics”, “data mining”, “big data” or “decision making”.

### **WHAT IS DATA SCIENCE?:**

- Data Science is the extraction of actionable knowledge directly from data through a process of discovery, hypothesis, and analytical hypothesis analysis.
- A Data scientist is a practitioner who has sufficient knowledge of the overlapping regimes of expertise in business needs, domain knowledge,

analytical skills and programming expertise to manage the end-to-end scientific method process through each stage in the big data lifecycle.

### **HEALTHCARE DATA ANALYTICS PLATFORM AND TOOL :**

- Advanced Data Visualization (ADV): ADV is different from other standards bars and line chart, since it can scale its visualization for millions of data points, also can handle different data types
- Presto: is a distributed SQL query engine used to analyze huge amount of data that collected every single day.
- Key Performance Indicators (KPI): KPI can improve quality of medical healthcare for patients who are susceptible to hospital conditions when KPI used to specify significant indicators to be monitored and corrected, as well as identifying weaknesses.
- MapReducing System: MapReducing system breaks Task into subtasks and gathering its outputs, as well as it enables many of the most common of operational calculations to be performed efficiently in a large amount of data.
- Text Mining: Text Mining tools can be used and add a value in healthcare in terms of analyzing clinical records from the hospital emergency departments of physician response on call, as a similar complaints called the emergency department and were treated differently depending on the person who answered the phone.

### **HEALTHCARE DATA CHALLENGES :**

- Large Scale: With the improvement of electromedical and wearable devices, the data volume of healthcare systems has been extensively increasing.



## **DATA BROKERS AND HEALTH**

### **INVESTMENT FUNDS :**

- Although some medical data are stored and available centrally (centralized data repositories), these constitute a fraction of the information about our health. In order to prevent diseases more efficiently, a full picture of a patient is necessary, and even the slightest details may be of great importance.
- Our diet, quality of sleep, physical activity, the amount of consumed alcohol and the time spent on the Internet – each part of our everyday reality describes our health to a certain extent. Because the amount of such data is vast, their analysis must be performed by algorithms based on artificial intelligence, to look for links and patterns and to separate valuable information from the unimportant.
- With time, collecting most of this information will become commonplace and its importance grows. This is for the physicians and healthcare providers, who will depend on accessing such data to achieve a better understand not only of our medical condition but also our needs, allowing them to personalize the methods of treatment or prevention. More and more often, we hear about such a model, where physicians subscribe to additional data concerning lifestyle.

## **HEALTH CARE WILL BECOME A SCIENCE FOCUSED ON DATA ENGINEERING :**

- For it to become a reality, health data have to be standardized so they can be included in a coherent, interoperable database. If this happens, health care will become a science focused on data engineering. This opens the door to new forms of health services.

- Data that we meticulously gather throughout our life will finally pay us back, just as our savings do today.
- Individual data brokers could offer new preventive and prognostic services. It would be sufficient to transfer our data to them, to allow them to store and analyze it. These could be either insurers or medical facilities specializing in preventive services.
- Medicine will undoubtedly transform towards the disease-prevention oriented model; hopefully, cheaper, more precise, personalized, and patient-friendly. Therefore, the physicians face an evolution toward becoming an adviser or health mentor.

### **BENEFITS :**

- Accuracy: : People tend to understate their weight and the degree to which they engage in negative behaviors .
- Consistency: Standards need to be defined and implemented to promote consistency in self-reported data across the healthcare system.
- Facility: Mechanisms based on e-health and m-health — such as mobility and social networking — need to be creative data.

### **CONCLUSION :**

However, a research in this area is kind of difficult, as it's hard to push healthcare sectors and public to adopt a new data analytics techniques and tools, however we believe that highlighting some of the main factors is useful as it would help and provide a guidance with respect for healthcare data mining and analytics, as it would add a benefit to the healthcare decision systems and improve healthcare performance in the future, as well as pointing to some of the possible gaps in this topic.

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